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Zhidov et al.

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(54) **TELEPHONE NETWORK SYSTEM AND METHOS**

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(73) Assignee: **Flypsi, Inc.**, Bedford, TX (US)

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H04M 3/42	(2006.01)
H04W 76/10	(2018.01)
H04M 3/56	(2006.01)
H04M 3/436	(2006.01)
H04L 29/06	(2006.01)

(52) **U.S. Cl.**

CPC ... ***H04M 1/72547*** (2013.01); ***H04M 3/42042*** (2013.01); ***H04M 3/42263*** (2013.01); ***H04M 3/42272*** (2013.01); *H04L 65/1069* (2013.01); *H04M 3/436* (2013.01); *H04M 3/565* (2013.01); *H04M 2203/5054* (2013.01); *H04W 76/10* (2018.02)

(58) **Field of Classification Search**

CPC . H04W 76/19; H04W 36/0055; H04W 76/18; H04W 36/08; H04W 76/27; H04W 36/0085; H04W 8/18; H04M 3/42042; H04M 2203/2011; H04M 3/42059; H04M 3/42102; H04M 3/42263; H04M 3/42272; H04M 3/42229; H04M 3/4365

See application file for complete search history.

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* cited by examiner

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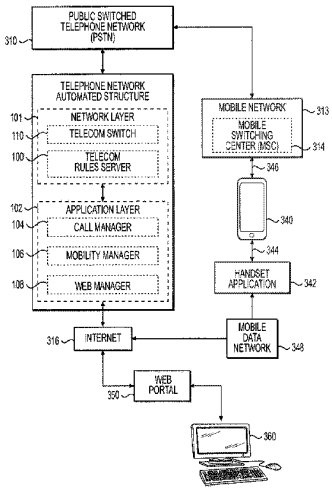
(57) **ABSTRACT**

Systems for and methods of delivering telephone calls using the combination of a data channel and a voice channel are disclosed. A data channel connection with the telephone handset may provide pre-call information used to set up incoming and outgoing calls which are ultimately connected using a voice channel. Use of the pre-call information may permit the same handset to be associated with multiple secondary telephone numbers from which calls appear to have been made and to which calls appear to have been placed.

12 Claims, 6 Drawing Sheets



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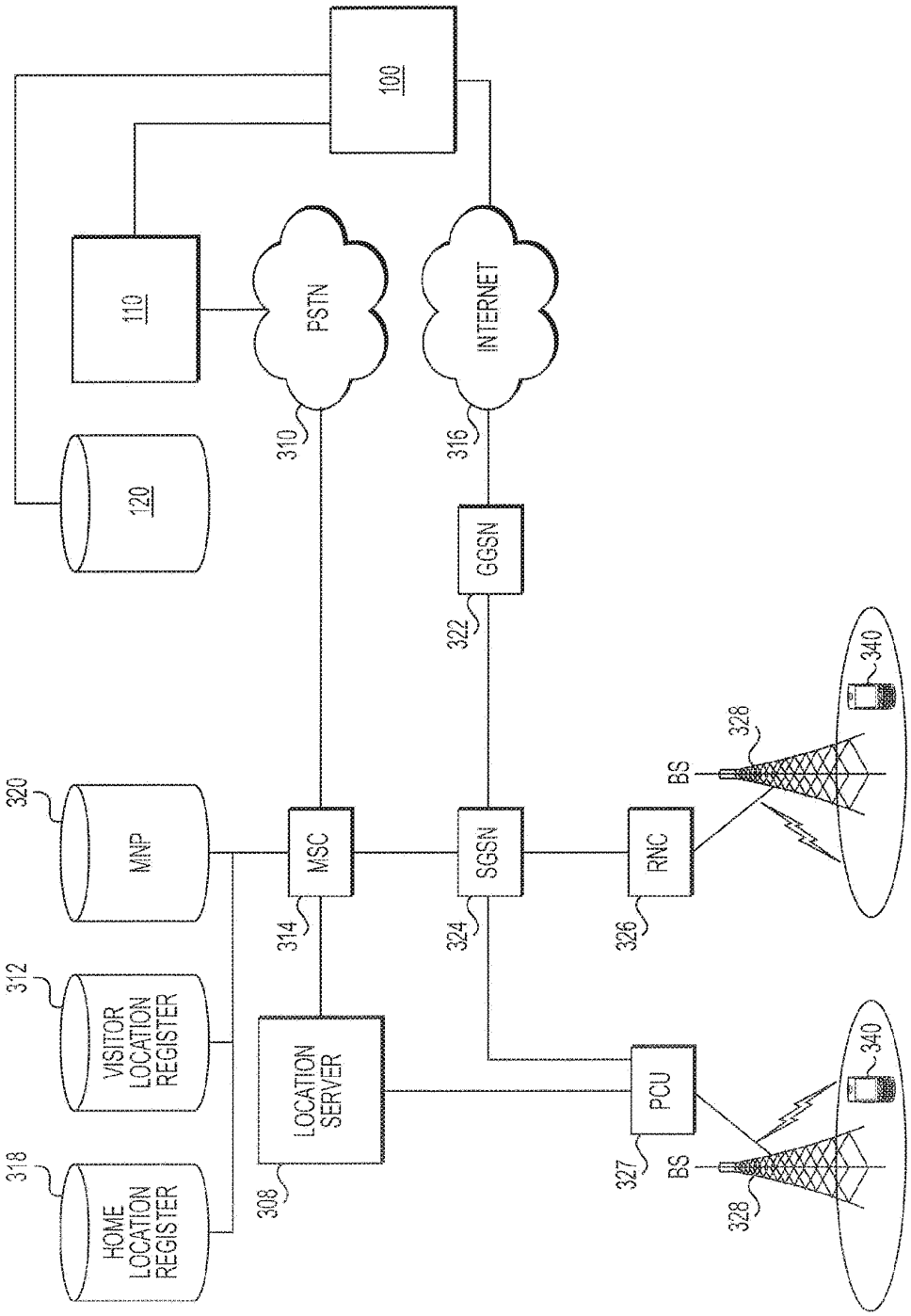
100
110
120
PSTN
INTERNET
310
316
GGSN
322
320
MNP
312
VISITOR LOCATION REGISTER
318
HOME LOCATION REGISTER
MSC
314
LOCATION SERVER
308
SGSN
324
RNC
326
PCU
327
BS
328
340

FIG. 1

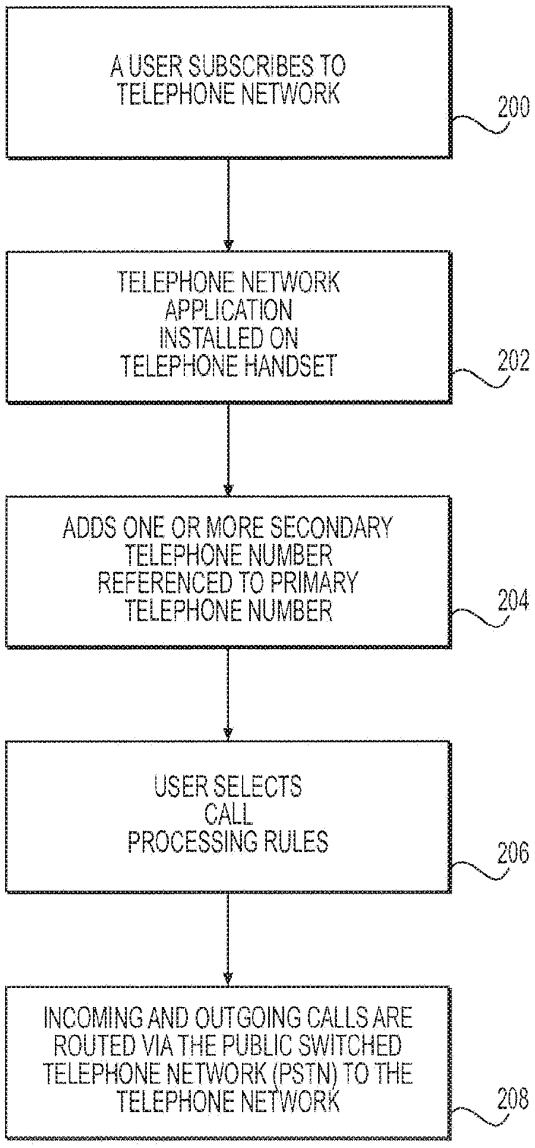
A USER SUBSCRIBES TO TELEPHONE NETWORK
200
TELEPHONE NETWORK APPLICATION INSTALLED ON TELEPHONE HANDSET
202
ADDS ONE OR MORE SECONDARY TELEPHONE NUMBER REFERENCED TO PRIMARY TELEPHONE NUMBER
204
USER SELECTS CALL PROCESSING RULES
206
INCOMING AND OUTGOING CALLS ARE ROUTED VIA THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN) TO THE TELEPHONE NETWORK
208

FIG. 2

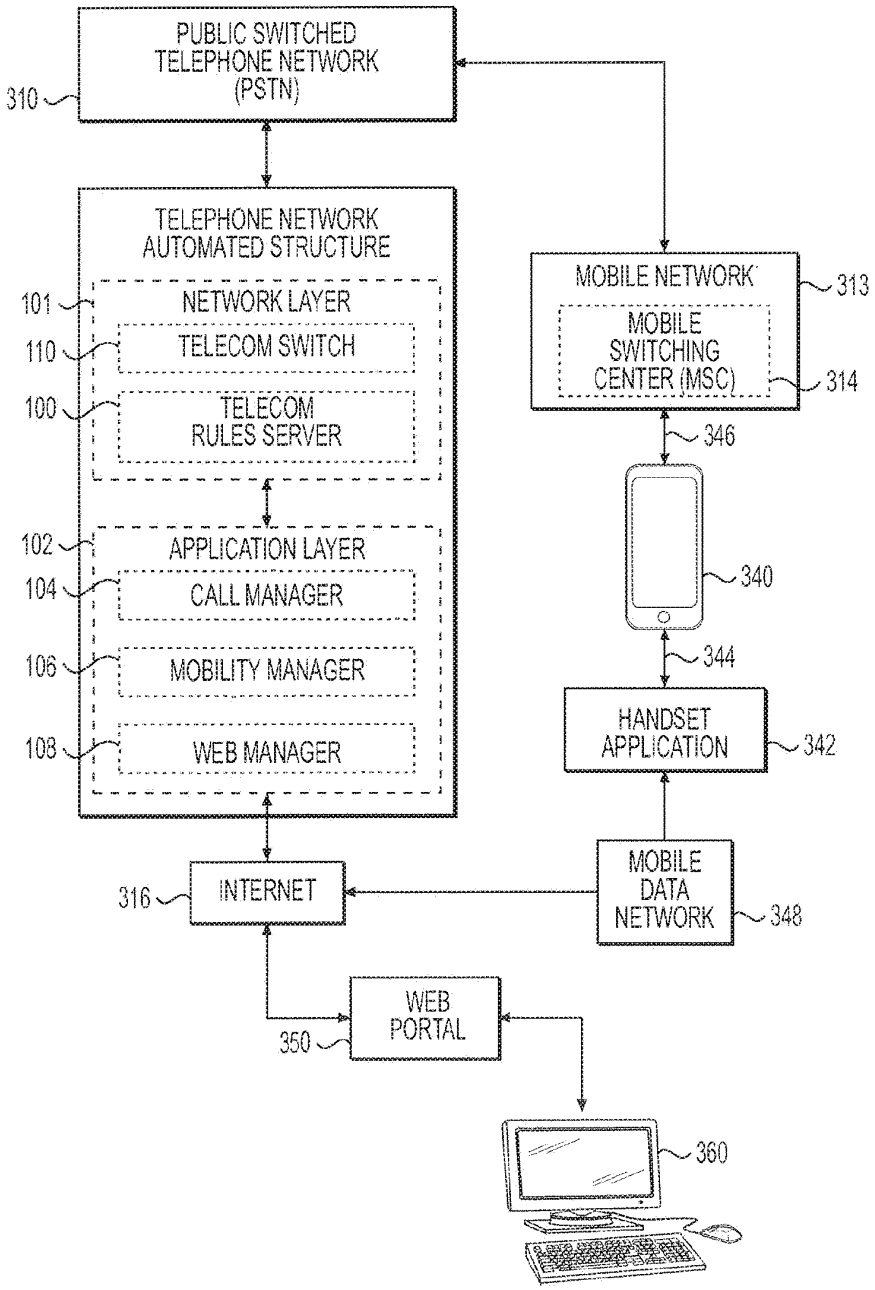
PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)
310
TELEPHONE NETWORK AUTOMATED STRUCTURE
101
NETWORK LAYER
110
TELECOM SWITCH
100
TELECOM RULES SERVER
102
APPLICATION LAYER
104
CALL MANAGER
106
MOBILITY MANAGER
108
WEB MANAGER
MOBILE NETWORK
313
MOBILE SWITCHING CENTER (MSC)
314
346
340
344
HANDSET APPLICATION
342
MOBILE DATA NETWORK
348
316
INTERNET
WEB PORTAL
350
360

FIG. 3

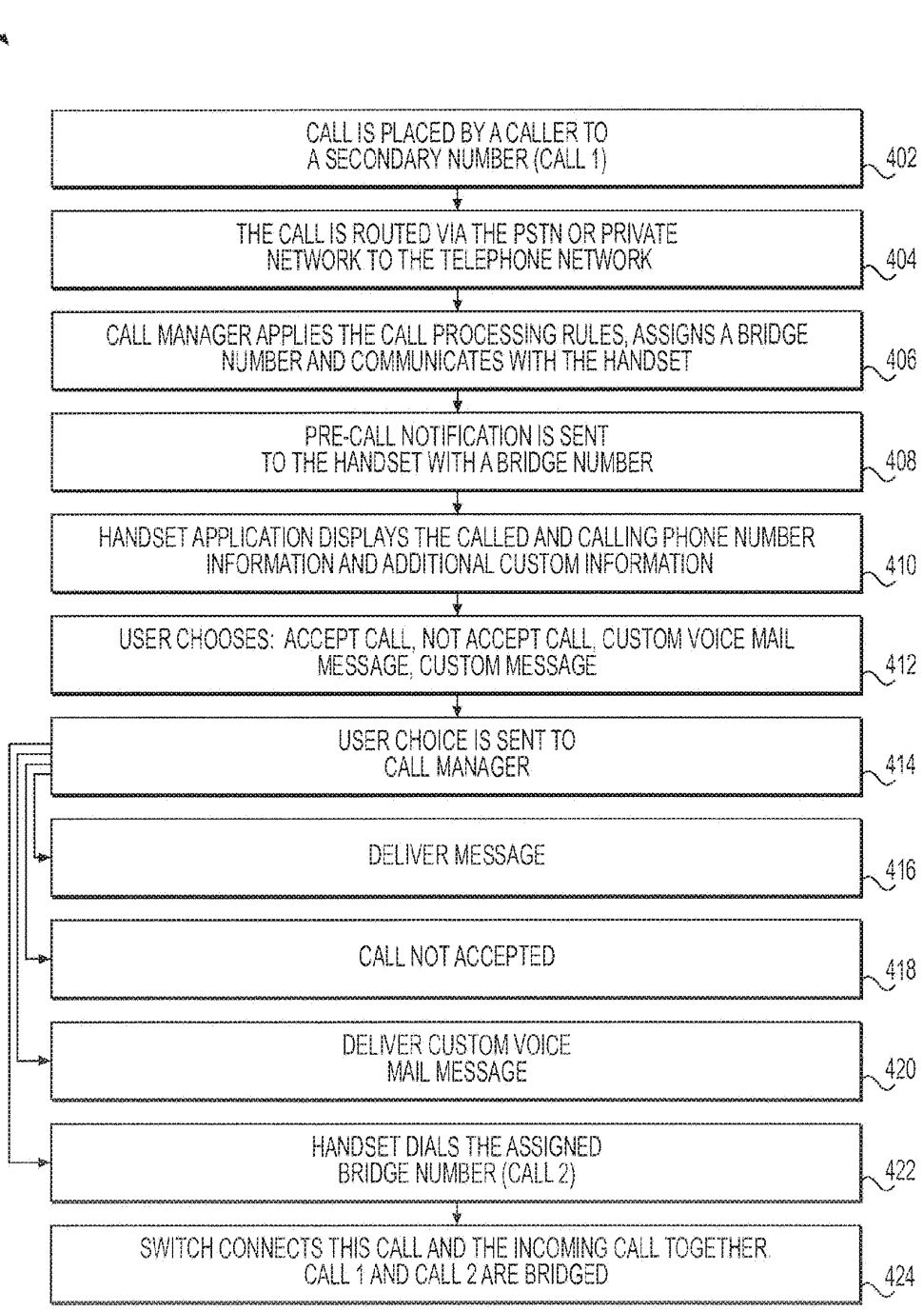
208
CALL IS PLACED BY A CALLER TO A SECONDARY NUMBER (CALL 1)
402
THE CALL IS ROUTED VIA THE PSTN OR PRIVATE NETWORK TO THE TELEPHONE NETWORK
404
CALL MANAGER APPLIES THE CALL PROCESSING RULES, ASSIGNS A BRIDGE NUMBER AND COMMUNICATES WITH THE HANDSET
406
PRE-CALL NOTIFICATION IS SENT TO THE HANDSET WITH A BRIDGE NUMBER
408
HANDSET APPLICATION DISPLAYS THE CALLED AND CALLING PHONE NUMBER INFORMATION AND ADDITIONAL CUSTOM INFORMATION
410
USER CHOOSES: ACCEPT CALL, NOT ACCEPT CALL, CUSTOM VOICE MAIL MESSAGE, CUSTOM MESSAGE
412
USER CHOICE IS SENT TO CALL MANAGER
414
DELIVER MESSAGE
416
CALL NOT ACCEPTED
418
DELIVER CUSTOM VOICE MAIL MESSAGE
420
HANDSET DIALS THE ASSIGNED BRIDGE NUMBER (CALL 2)
422
SWITCH CONNECTS THIS CALL AND THE INCOMING CALL TOGETHER. CALL 1 AND CALL 2 ARE BRIDGED
424

FIG. 4

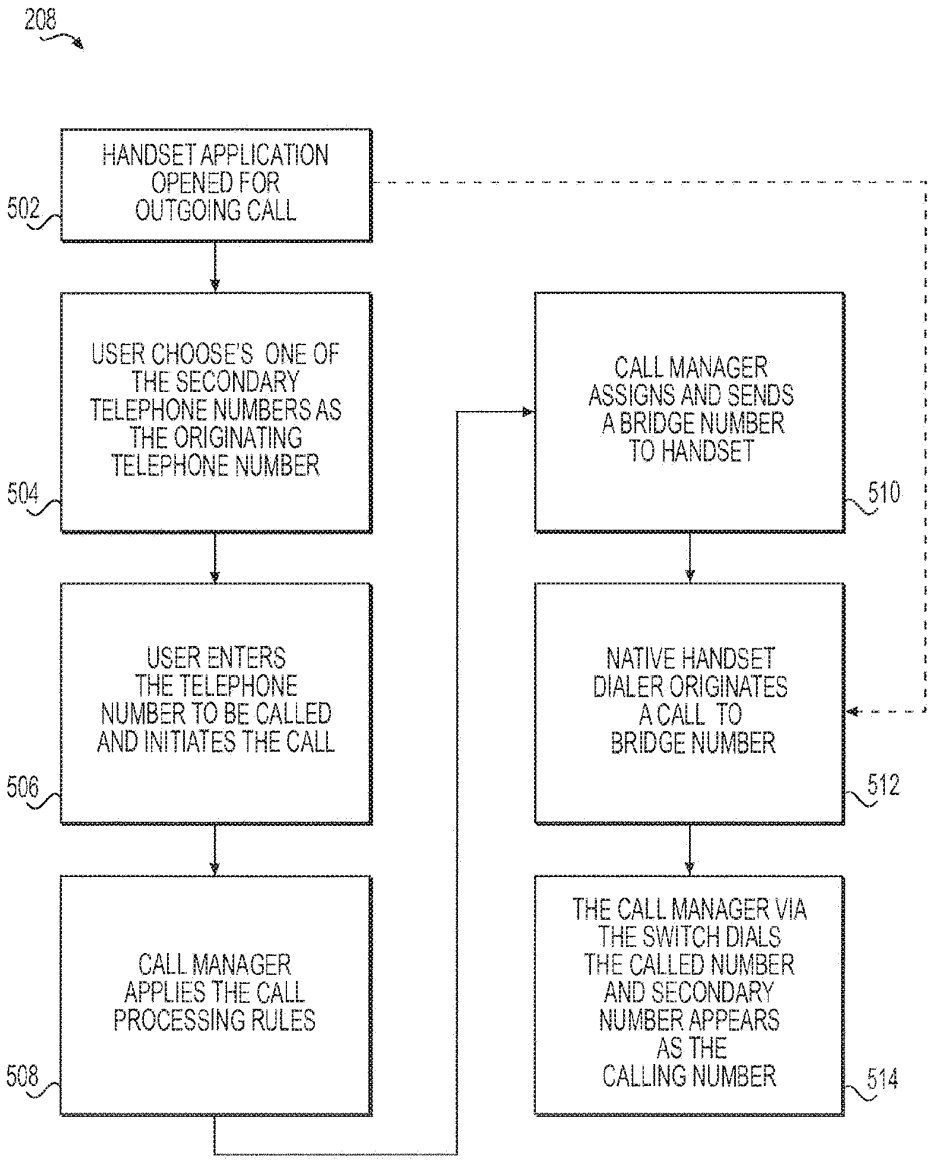
208
HANDSET APPLICATION OPENED FOR OUTGOING CALL
502
USER CHOOSE'S ONE OF THE SECONDARY TELEPHONE NUMBERS AS THE ORIGINATING TELEPHONE NUMBER
504
USER ENTERS THE TELEPHONE NUMBER TO BE CALLED AND INITIATES THE CALL
506
CALL MANAGER APPLIES THE CALL PROCESSING RULES
508
CALL MANAGER ASSIGNS AND SENDS A BRIDGE NUMBER TO HANDSET
510
NATIVE HANDSET DIALER ORIGINATES A CALL TO BRIDGE NUMBER
512
THE CALL MANAGER VIA THE SWITCH DIALS THE CALLED NUMBER AND SECONDARY NUMBER APPEARS AS THE CALLING NUMBER
514

FIG. 5

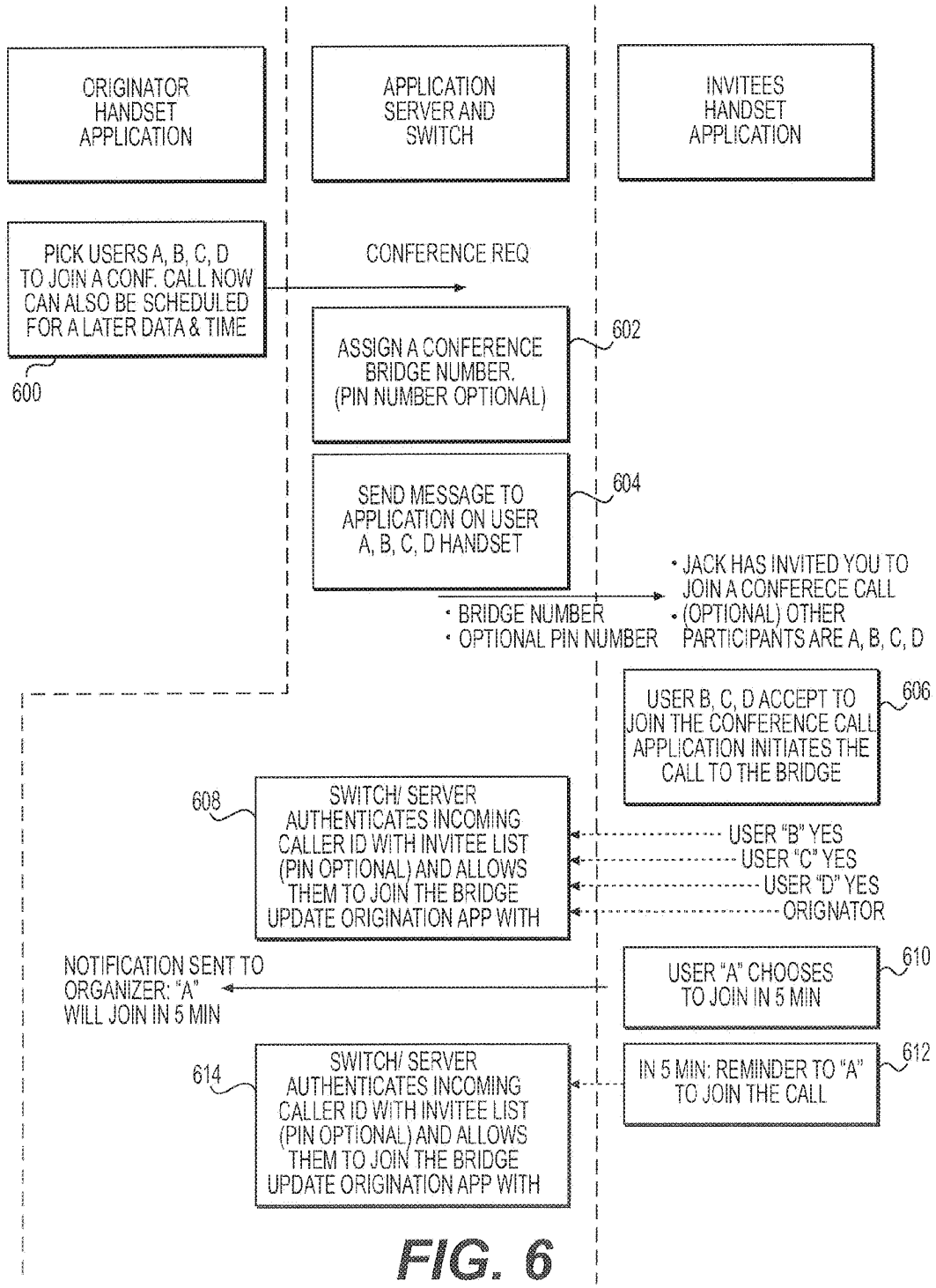
ORIGINATOR HANDSET APPLICATION
APPLICATION SERVER AND SWITCH
INVITEES HANDSET APPLICATION
PICK USERS A, B, C, D TO JOIN A CONF. CALL NOW CAN ALSO BE SCHEDULED FOR A LATER DATA & TIME
600
CONFERENCE REQ
ASSIGN A CONFERENCE BRIDGE NUMBER. (PIN NUMBER OPTIONAL)
602
SEND MESSAGE TO APPLICATION ON USER A, B, C, D HANDSET
604
• BRIDGE NUMBER
• OPTIONAL PIN NUMBER
• JACK HAS INVITED YOU TO JOIN A CONFERECE CALL
• (OPTIONAL) OTHER PARTICIPANTS ARE A, B, C, D
USER B, C, D ACCEPT TO JOIN THE CONFERENCE CALL APPLICATION INITIATES THE CALL TO THE BRIDGE
606
608
SWITCH/ SERVER AUTHENTICATES INCOMING CALLER ID WITH INVITEE LIST (PIN OPTIONAL) AND ALLOWS THEM TO JOIN THE BRIDGE UPDATE ORIGINATION APP WITH
USER "B" YES
USER "C" YES
USER "D" YES
ORIGNATOR
NOTIFICATION SENT TO ORGANIZER: "A" WILL JOIN IN 5 MIN
USER "A" CHOOSES TO JOIN IN 5 MIN
610
614
SWITCH/ SERVER AUTHENTICATES INCOMING CALLER ID WITH INVITEE LIST (PIN OPTIONAL) AND ALLOWS THEM TO JOIN THE BRIDGE UPDATE ORIGINATION APP WITH
IN 5 MIN: REMINDER TO "A" TO JOIN THE CALL
612

FIG. 6

TELEPHONE NETWORK SYSTEM AND METHOS

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is a divisional application and claims the benefit of priority to co-pending U.S. patent application Ser. No. 16/444,753, filed Jun. 18, 2019, by Zhidov, et al., which is a divisional application of U.S. patent application Ser. No. 16/031,806 (now U.S. Pat. No. 10,334,094), filed Jul. 10, 2018 by Zhidov, et al., which is a continuation application of U.S. patent application Ser. No. 15/582,091 (now U.S. Pat. No. 10,051,105), filed Apr. 28, 2017, by Zhidov, et al., which is a continuation application of U.S. patent application Ser. No. 14/307,052 (now U.S. Pat. No. 9,667,770), filed Jun. 17, 2014, by Zhidov, et al., which is a continuation-in-part application of US patent application Ser. No. 13/944,853, filed Jul. 17, 2013, by Zhidov, et al., the complete contents of each of which is hereby incorporated herein by reference.

BACKGROUND

Technical Field

The present invention relates to systems and methods for setting up and connecting telephone calls, and delivering information related to such telephone calls using an Internet Protocol (IP) or other data channel while delivering the voice portion of the call in accordance with CDMA, GSM or like voice channel delivery standards.

Background

The volume of telephone calls and text messaging has increased dramatically and users are finding it more and more difficult to manage that volume of calls and messages. The current systems to aid in managing some types of calls only provide minimal assistance to the user. It is therefore an advantage of some, but not necessarily all, embodiments of the present invention to provide systems and methods for assisting callers and call recipients with the management of calls and messages.

Additional advantages of various embodiments of the invention are set forth, in part, in the description that follows and, in part, will be apparent to one of ordinary skill in the art from the description and/or from the practice of the invention.

SUMMARY

Responsive to the foregoing challenges, Applicant has developed an innovative method of providing telephone service by transmitting call handling information between a handset and a switch using an IP channel or similar protocol channel and by transmitting a voice call associated with the call handling information between the handset and the switch using a voice channel provided in accordance with a voice channel protocol, e.g., in accordance with CDMA or GSM, 3G, 4G, LTE or like future protocol channels standards.

Applicant has further developed an innovative method of providing telephone service comprising: automatically storing electronic information that indicates an association of a secondary telephone number and a primary telephone number with a telephone handset in a computer memory associated with a server; automatically storing electronic information that indicates a selection of call processing rules for the primary telephone number in the computer memory; automatically storing electronic information that indicates a selection of call processing rules for the secondary telephone number in the computer memory; receiving an electronic indication of an incoming call to the secondary telephone number at the server, said electronic indication of an incoming call being received from a switch associated with the server; automatically accessing the call processing rules for the secondary telephone number under the control of the server responsive to the receipt of the electronic indication of the incoming call to the secondary telephone number; automatically handling the incoming call in accordance with the accessed call processing rules for the secondary telephone number; transmitting pre-call information via a data channel to the handset under the control of the server, said pre-call information including a bridge telephone number for connecting the handset to the incoming call at the switch; and receiving, at the server via the data channel, an electronic indication of a selection of a call processing rule for handling the incoming call to the secondary telephone number, or establishing a voice channel connection between the handset and the switch as a result of the handset calling the switch using the bridge number.

Applicant has further developed an innovative method of providing telephone service, comprising: automatically storing electronic information that indicates an association of a secondary telephone number and a primary telephone number with a telephone handset in a computer memory associated with a server; automatically associating a unique bridge telephone number with each of a plurality of contact telephone numbers in the computer memory; automatically transmitting information that indicates the association of the unique bridge telephone number with each of a plurality of contact telephone numbers to the handset via the data channel; automatically associating each primary telephone number and bridge telephone number pairing with a corresponding secondary telephone number and contact telephone number pairing in the computer memory; receiving, at a switch associated with the server, an outgoing call from the handset to the bridge telephone number via a voice channel; receiving, at the server, information from the switch indicating the outgoing call is being made to the bridge telephone number from the primary telephone number; receiving, at the switch, information from the server directing the switch to: (a) connect the outgoing call to a contact telephone number associated with the primary telephone number and bridge telephone number pairing, and (b) identify the telephone number from which the outgoing call is being made as the secondary telephone number.

Applicant has still further developed an innovative method of providing telephone service, comprising: enrolling a telephone handset in a telecommunications system having a server and a switch, wherein said telephone handset is associated with a primary telephone number in a database associated with the server and switch; electronically transmitting an application from the server to the telephone handset via a data channel responsive to telephone handset enrollment, wherein said application is: adapted to send instructions to have one or more secondary telephone numbers referenced to the primary telephone number in the database, adapted to present visually perceptible call processing rules on the telephone handset, and adapted to transmit information indicating a selection of call processing rules from the telephone handset to the server; electronically receiving instructions from the telephone handset via the

data channel to reference the one or more secondary telephone numbers to the primary telephone number; storing telephone handset information, including the primary telephone number and the one or more secondary telephone numbers referenced to the primary telephone number, in the database; electronically receiving instructions from the telephone handset via the data channel to store user selected call processing rules for the telephone handset in the database, wherein the user selected call processing rules include instructions to route calls over a voice channel in a manner that will indicate that the calls are made to or from the one or more secondary telephone numbers; electronically transmitting information to the telephone handset via the data channel, said information being adapted to cause a pre-call information to be displayed on the telephone handset responsive to initiation of an outgoing call using the one or more secondary telephone numbers or an incoming call to the one or more secondary telephone numbers; electronically receiving from the telephone handset via the data channel call handling information indicating a user selected call processing rule to be used to process the outgoing or incoming call; and automatically handling the outgoing or incoming call based on the call handling information.

Applicant has still further developed an innovative method of providing telephone service, comprising: associating a telephone handset with primary and secondary telephone numbers in a database; receiving, from the telephone handset via a data channel, digital information indicating primary call processing rules for handling calls to the first telephone number; storing the primary call processing rules digitally; receiving, from the telephone handset via the data channel, digital information indicating secondary call processing rules for handling calls to the secondary telephone number; storing the secondary call processing rules digitally; receiving a call request to the secondary telephone number; transmitting pre-call information to the telephone handset via the data channel responsive to receipt of the call request, wherein said pre-call information is based on the secondary call processing rules; responsive to the pre-call information, receiving information indicative of a user input to the telephone handset over the data channel; and processing the call based on the stored alternative call processing rules and user input to the telephone handset, wherein said processing includes an option of connecting the call over a voice channel.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only, and are not restrictive of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to assist the understanding of this invention, reference will now be made to the appended drawings, in which like reference characters refer to like elements.

FIG. **1** is a schematic diagram illustrating a network architecture that may be used to provide telephone service in accordance with embodiments of the present invention.

FIG. **2** is a block diagram illustrating a method of providing telephone calls in accordance with embodiments of the present invention.

FIG. **3** is a block diagram illustrating data channel and voice channel connections used to provide telephone service in accordance with embodiments of the present invention.

FIG. **4** is a block diagram illustrating a method of setting up and connecting an incoming call in accordance with one embodiment of the present invention.

FIG. **5** is a block diagram illustrating a method of setting up and connecting an outgoing call in accordance with one embodiment of the present invention.

FIG. **6** is a call sequence diagram illustrating a method of setting up and connecting a conference call in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments of the present invention, examples of which are illustrated in the accompanying drawings. It is to be understood that other embodiments may be utilized and structural changes may be made without departing from the scope of the present invention.

It should be noted that in connection with the described embodiments, reference is made to a data channel. A preferred data channel may be an Internet Protocol (IP) channel, which is not a conventional telephone voice channel. However, other data, non-conventional voice, channels over which information may be transmitted between a telephone handset and a server may be used in alternative embodiments of the invention.

With reference to FIG. **1**, embodiments of the present invention may be implemented using a system having a server **100**, associated computer memory, such as a database **120**, and an associated telecommunications switch **110** which communicate through a network with a telephone handset **340**. The server **100** may be connected to the database **120** and the switch **110**. The server **100** may also be connected via the Internet **316** through one or more nodes, such as a Gateway GPRS Support Node (GGSN) **322** and a Servicing GPRS Support Node (SGSN) **324**, to a mobile network **313**. The switch **110** may be connected through the PSTN **310** to the mobile network **313** at a Mobile Switching Center (MSC) **314**. In turn, the MSC **314** may be connected to a Home Location Register database (HLR) **318**, a Visitor Location Register database (**312**), a Mobile Number Portability database (MNP) **320**, a location server **308**, and the SGSN **324**. The SGSN **324** may be connected to one or more Radio Network Controllers (RNC) **326** and/or one or more Processor Control Units (PCU) **327**, which in turn may be connected to one or more Base Stations (BS) **328** and to one or more mobile devices referred to collectively as "handsets" **340**.

The communications between the server **100** and the handset **340** over the Internet **316** may utilize IP as a protocol opposed to protocols used to establish communications according to CDMA, GSM, or like standards. Such IP governed communications are referred to herein as being conducted over a "data channel." Conversely, communications between the switch **110** and the handset over the PSTN **310** may be transmitted and received in accordance with CDMA, GSM or like standards as opposed to using IP. Such CDMA, GSM or like governed communications, when used to carry voice information, are referred to herein as being conducted over a "voice channel."

With reference to FIGS. **1** and **2**, method embodiments of the invention may be facilitated starting with step **200** in which a handset **340** may be used to subscribe to 10 the telephone network that includes the server **100** and switch **110** used to provide telephone service in accordance with embodiments of the invention. A user may subscribe to the telephone network in step **200** by enrolling the telephone handset **340** using a data channel connection between the handset and the server **100**. Responsive to a data channel request received from the handset **340**, a handset application

may be transmitted to the handset from the server **100**, and installed and stored in memory associated with the handset in step **202**. Once the handset application is installed on the handset **340**, the handset may connect to the server **100** by operation of the handset application as needed over a data channel connection which may include the BS **328**, RNC **326** or PCU **327**, SGSN **324**, GGSN **322**, and Internet **316**.

In connection with step **204**, the server **100** may transmit information to the handset **340** via the data channel, which, through automatic operation of the handset application, permits the user to select one or more secondary telephone numbers to be referenced to a primary telephone number for the handset. The primary telephone number, preferably, may be a SIM number or ESN which is assigned to the handset **340** at the time of activation. Once selected, the handset **340** may automatically transmit information which to the server **100** over the data channel which requests that the secondary telephone numbers be associated with the primary telephone number. In response. the server **100** may store (i.e., reference) information indicating the association of the one or more selected secondary telephone numbers in computer memory associated with the server such as the database **120**. In an alternative embodiment, the server **100** may automatically assign one or more secondary telephone numbers to the handset **340**, as opposed to them being selected.

In step **206** of FIG. **2**, the handset **340** may be used to access the handset application installed thereon to select call processing rules for handling incoming and outgoing voice channel calls to and from the handset **340**. Information indicating call processing rules may be transmitted from the handset **340** to the server **100** via the data channel by automatic operation of the handset application. Custom call processing rules may be selected for, and associated with, each of the primary telephone number and the one or more secondary telephone numbers associated with the primary telephone number. The call processing rules information may be automatically stored in a computer memory, such as database **120**, by the server **100**. An indication of the association of particular call processing rules with a particular **10** handset **340** and particular primary and/or secondary telephone numbers may also be stored in the database **120**. The call processing rules may include preset responses for incoming calls, such as custom stored voice message(s) and/or custom stored text message(s) to be associated with the primary and/or one or more secondary telephone numbers. The call processing rules may further permit the handset **340** to be used to control the availability of the secondary telephone numbers as well as activation of additional secondary telephone numbers and deactivation of existing secondary telephone numbers. Information indicating the call processing rules for the primary telephone number and secondary telephone numbers may be stored automatically in memory associated with the handset **340**. The call processing rules may further include stock rules used for all telephone numbers, such as an option to accept or not accept (i.e., drop) an incoming call. With reference to step **208**, the application stored on the handset **340** may enable it to be used to receive incoming calls from, and place outgoing calls to, a recipient telephone (not shown) which is connected to the PSTN **310**, as explained in more detail below.

With reference to FIGS. **3** and **4**, the handset **340** may be used to receive incoming (terminating) calls to a secondary telephone number, using a telephone network automated structure having a network layer **101** and an application layer **102** associated therewith. An incoming call to the secondary telephone number may be placed in step **402** by a calling party. The incoming call is routed from the caller's telephone to the PSTN **310**. In step **404**, the incoming call may be routed over the PSTN **310** to the switch **110** Responsive to receipt of the incoming call at the switch **110**, a Call Manager **104** application, which cooperates with a Mobility Manager **106** application, and a Web Manager **108** application, which are all associated with the server **100**, may access the call processing rules in the database **120** which are associated with the secondary telephone number that is being called. Subject to the accessed call processing rules, the Call Manager **104** may assign or look up a bridge telephone number to be used for completion of the call in step **406**. The bridge telephone number may be associated with the switch **110**, and calls to the bridge telephone number may be automatically routed to this switch.

The call processing rules may provide for call routing via a call distribution algorithm where the call could be routed to one or many telephone numbers. The call processing rules may be user selectable and configurable, and may apply to voice, text and/or other data messaging. The call processing rules may govern how calls are handled and may provide automated call routing or call dropping based on location data of the calling and/or called party. The call processing rules may further govern handling calls based on incoming caller ID, which may identify a calling party as being on an accepted caller ID list or a non-accepted caller ID list. The call processing rules may further provide call routing based on weekday, weekend, holiday, time of day, biometrics data, and accelerometer data information. The call processing rules may still further provide call routing based on an interface with a handset **340** calendar to check availability to accept calls. Such calendars may include, for example, Outlook, Google Calendar, and other user calendars.

If the call processing rules indicate that the secondary telephone number is not available to this particular caller, or to all callers, however, the Call Manager **104** may apply such rule or rules and reject the incoming call at the conclusion of step **406**. Application of the call processing rules for a call rejection may result in the call simply not being answered, being dropped, or automated return of a voice, text, or other type of message to the calling telephone number or a communication device associated therewith.

On the other hand, if the call processing rules permit completion of the call, in step **408** the Call Manager **104** may transmit pre-call notification information to the handset **340**, which includes the assigned/looked up bridge telephone number, via the data channel connection, i.e., over the Internet **316** and the Mobile Data Network **348**. The pre-call information may include information used by the application installed on the handset **340** to cause a display of the calling telephone number, the calling party name, calling party location, such as GPS location, and/or the called secondary telephone number, as well as other information in step **410**. The incoming pre-call information may be received at the handset **340** before or during the call ringing on the handset.

In step **412**, responsive to receipt of the incoming pre-call notification information, the handset application may cause the handset **340** to display call handling choices for the call. For example, the handset **340** may be directed under the control of the handset application to display receive call, drop call, custom voice mail message, and/or custom text message choices. The choices may be selected through interaction with the handset **340**, all before the call is connected or dropped. In step **414**, the selection of either delivering a responsive text message (**416**), not accepting, i.e., "dropping" the call (**418**), or responding to the call with a custom voice message (**420**) may be transmitted from the

handset **340** to the server **100** via the data channel. Thereafter, the Call Manager **104** may automatically implement the drop call or respond with text or voice message instructions received over the data channel, and the call attempt may be terminated thereafter.

If the call is accepted in step **414**, however, the handset application may automatically cause the handset **340** to call the bridge telephone number in step **422** over a voice channel. The return call from the handset **340** to the bridge telephone number may be routed over the PSTN **310** to the switch **110** using a voice channel connection. In step **424**, once the call to the bridge telephone number is received at the switch **110**, the switch may "bridge" the incoming voice channel call to the bridge telephone number with the incoming voice channel call to the secondary telephone number to thereby connect the incoming call from the calling party to the handset **340** via a voice channel. Further, the switch **110** may automatically send signaling information to the calling party telephone which causes the secondary telephone number to be displayed as the number to which the call has been completed.

With continued reference to FIG. **3**, the web manager **108** may be used to process Internet **316** transactions for the server **110**. The system may also employ a web portal **350** to link a digital device **360** other than a handheld **340** to the telecommunications system for calling in accordance with embodiments of the invention. For example, embodiments of the invention may be used with digital devices **360** such as a desktop computer, laptop computer, IPad, tablet, IPod **790**, or the like.

With reference to FIGS. **3** and **5**, the handset **340** may be used to place outgoing (originating) calls from a secondary telephone number, using the telephone network automated structure shown in FIG. **3** and described above. If the party to be called has not yet been called using a secondary telephone number, an outgoing call from the handset **340** may be initiated to such party in step **502** by opening the handset application installed thereon. Once the handset application is open, the handset **340** may be used to choose a secondary telephone number as the originating telephone number in step **504**. A list of such secondary telephone numbers may be stored in memory associated with the handset.

In step **506**, the handset **340** may be used to enter, or select from an address file, a contact telephone number to be called in order to initiate a call to such telephone number. The handset application may cause the handset **340** to transmit information to the server **100** Call Manager **104** via the data channel automatically as a result of the selection of the secondary telephone number and the contact telephone number. The transmitted information may indicate the secondary telephone number from which the call is to appear to the called party to have been placed, and the contact telephone number to be called.

In step **508**, responsive to receipt of the data channel communication from the handset **340** requesting set up of a call from it to the telephone number to be called, the Call Manager **104** may access the call processing rules in the database **120** which are associated with the secondary telephone number from which the call is to appear to have been placed. In step **510**, subject to the accessed call processing rules, the Call Manager **104** may assign a bridge telephone number to be used to connect the call from the handset **340** to the switch **110** and send pre-call information including the bridge telephone number to the handset via the data channel.

The bridge telephone number may be associated with the switch **110**, and calls to the bridge telephone number may be automatically routed to this switch. Once the bridge telephone number is assigned, the server **100** under the control of the Call Manager **104**, may store information in the database **120** which associates the bridge telephone number with the primary telephone number for the handset **340**, the secondary telephone number selected for the call, and the contact telephone number to be called. More specifically, the stored information may indicate that each combination of primary telephone number and bridge telephone number are uniquely associated with each combination of secondary telephone number and contact telephone number. In other words, each combination of primary telephone number and bridge telephone number for the handset **340** map to a unique combination of secondary telephone number and contact telephone number in the database **120** memory.

In step **512**, responsive to receipt of the bridge telephone number information over the data channel, the handset application may cause the handset **340** to automatically call the bridge telephone number via a voice channel. The return call from the handset **340** to the bridge telephone number may be routed over the PSTN **310** to the switch **110** using a voice channel connection.

In step **514**, the Call Manager **104** may instruct the switch **110** to place a voice channel call to the telephone number to be called using the secondary telephone number as the originating telephone number from the switch. Once the call to the bridge telephone number from the handset **340** is received at the switch **110**, the switch may "bridge" the incoming voice channel call to the bridge telephone number with the outgoing voice channel call from the secondary telephone number to the contact telephone number to thereby connect the outgoing call from the handset **340** to the party being called via a voice channel. Further, the switch **110** may automatically send signaling information to the called party telephone which causes the secondary telephone number to be displayed as the number from which the call appears to have been placed. Because each pairing of a primary telephone number and a bridge telephone number maps to a unique contact telephone number and secondary telephone number pairing, the call can be completed at the switch **110** to the correct contact telephone number while showing the desired secondary telephone number as the originating number.

With continued reference to FIG. **5**, in the event that the contact telephone has been previously called using the secondary telephone number on the handset **340**, the user may directly select the bridge telephone number associated with the secondary telephone number and contact telephone number in step **506** either using the handset application in step **502**, or without opening the handset application in step **512**. Alternatively, the handset may have a stored "shortcut" which, when the user selects the contact telephone number to be called from the secondary telephone number, results in the associated bridge telephone number being dialed. In either case, the handset **340** may dial the bridge telephone number to connect with the Call Manager **104** in step **512**. In step **514**, the Call Manager **104** may look up the secondary telephone number and the contact telephone number associated with the paired bridge telephone number and primary telephone number for the handset **340**. Thereafter, the switch **110** may dial the contact telephone number and bridge the call from the handset **340** in a manner that makes the secondary telephone number appear to be the telephone number from which the call is being placed.

FIG. **6** is a call flow diagram illustrating a method of setting up and connecting a multi-party conference call in accordance with an embodiment of the present invention.

With reference to FIGS. **3** and **6**, the communication sequence for a conference call is illustrated between the handset application stored on the handset **340**, the Call Manager **104** application associated with the server **100** and switch **110**, and a conference call invitee handset. In step **600**, the application on the handset **340** may be used to select invitees (users) for a conference call. The telephone numbers of the invitees may be selected from an address book or manually entered. Further, the conference call may be selected to be initiated immediately, or at some future date and time.

Once the invitees are selected, the handset **340** may be instructed by the handset application to transmit a conference request to the server **100** via a data channel. In step **602**, the Call Manager **104** operating on the server **100** may assign a conference bridge telephone number to the conference call in response to receipt of the conference request. In step **604**, the Call Manager **104** may cause the server **100** to send conference invitation messages to each of the invitee handsets, and more specifically, applications stored on the invitee handsets, via a data channel. The invitation messages may include the assigned bridge telephone number for the conference call and an optional PIN or code number for the conference call. The invitation message may provide a notice, for example, "Jack has invited you to join a conference call," and further include identification of other invited participants.

In step **606**, each invitee handset may be used to accept to join the conference call, join at a later time, or decline to join. If the acceptance is for a future scheduled conference call, an indication of the acceptance (including acceptance to join late) may be transmitted from each invitee handset under the control of the application installed thereon, to the server **100** Call Manager **104** via the data channel. Further, if the invitation is declined altogether, an indication thereof may be transmitted from each invitee handset to the server **100**. Thereafter, the Call Manager **104** may transmit information to the originating handset **340**, and optionally the invitee handsets, via the data channel, which indicates acceptance of a future conference call, acceptance to join late (step **610**), or declination of the conference call invitation.

If the conference call invitation is accepted and it is time for the call, each accepting invitee handset may automatically or manually dial the bridge telephone number using a voice channel. The switch **110** may receive the voice channel calls to the bridge telephone number and may authenticate the invitees right to join the conference call in step **608** by comparing the invitee's telephone number with that of the invitee list, as well as comparing any PIN input by the invitee with the PIN selected for the conference call. If the authentication is successful, the invitee handset is connected to the call via the voice channel. An automatic update may be transmitted via the data channel from the server to the originating handset **340** indicating that a particular invitee handset has joined the conference call.

If an invitee chose to join late, the server **100** may automatically transmit a reminder to the affected invitee handset to join the call at the agreed time in step **612**. Thereafter, the late joining invitee handset may dial the bridge telephone number automatically or manually using a voice channel. The switch **110** may receive the voice channel call to the bridge telephone number, authenticate the late joining invitee handset, and connect the handset to the conference call in step **614**.

The foregoing has described the principles, embodiments and modes of operation of the present invention. However, the invention should not be construed as being limited to the particular embodiments discussed. The above described embodiments should be regarded as illustrative rather than restrictive, and it should be appreciated that variations may be made in those embodiments by workers skilled in the art without departing from the scope of the present invention as defined by the following claims.

What is claimed:

1. A method of providing telephone service, comprising:

automatically storing electronic information that indicates an association of a secondary telephone number and a primary telephone number with a mobile device in a computer memory associated with a server;

automatically transmitting information that indicates an access telephone number to the mobile device via a data channel;

automatically associating the telephone access number with a switch associated with the server;

receiving, at the switch associated with the server, an outgoing call from the mobile device to the access telephone number via a second channel;

receiving, at the server, information from the switch indicating the outgoing call is being made to the access telephone number from the primary telephone number; and

receiving, at the switch, information from the server directing the switch to:

(a) connect the outgoing call to a contact telephone number indicated by the mobile device, and

(b) identify a telephone number from which the outgoing call is being made as the secondary telephone number.

2. The method of claim **1**, wherein the data channel is an Internet protocol (IP) channel.

3. The method of claim **2**, wherein the second channel is established in accordance with a CDMA or GSM standard.

4. The method of claim **1**, wherein the second channel is not an Internet Protocol (IP) channel.

5. An apparatus, comprising:

a memory; and

a processor operatively coupled to the memory;

the processor configured to automatically store electronic information that indicates an association of a secondary telephone number and a primary telephone number with a mobile device in a computer memory associated with a server;

the processor configured to automatically transmit information that indicates an access telephone number to the mobile device via a data channel;

the processor configured to automatically associate the telephone access number with a switch associated with the server;

the processor configured to receive, at the server, information from the switch associated with the server and in response to the switch receiving an outgoing call from the mobile device to the access telephone number via a second channel;

the information indicating the outgoing call is being made to the access telephone number from the primary telephone number;

the processor configured to send, to the switch, information from the server directing the switch to:

(a) connect the outgoing call to a contact telephone number indicated by the mobile device; and

(b) identify a telephone number from which the outgoing call is being made as the secondary telephone number.

6. The apparatus of claim **5**, wherein the data channel is an Internet Protocol (IP) channel.

7. The apparatus of claim **5**, wherein the second channel is established in accordance with a CDMA or GSM standard.

8. The apparatus of claim **5**, wherein the second channel is not an Internet Protocol (IP) channel.

9. A non-transitory processor-readable medium storing code representing instructions to be executed by a processor, the code comprising code to cause the processor to:

automatically store electronic information that indicates an association of a secondary telephone number and a primary telephone number with a mobile device in a computer memory associated with a server;

automatically transmit information that indicates an access telephone number to the mobile device via a data channel;

automatically associate the telephone access number with a switch associated with the server;

receive, at the server, information from the switch associated with the server and in response to the switch receiving an outgoing call from the mobile device to the access telephone number via a second channel,

the information indicating the outgoing call is being made to the access telephone number from the primary telephone number; and

send, to the switch, information from the server directing the switch to:

(a) connect the outgoing call to a contact telephone number indicated by the mobile device, and

(b) identify a telephone number from which the outgoing call is being made as the secondary telephone number.

10. The non-transitory processor-readable medium of claim **9**, wherein the data channel is an Internet Protocol (IP) channel.

11. The non-transitory processor-readable medium of claim **9**, wherein the second channel is established in accordance with a CDMA or GSM standard.

12. The non-transitory processor-readable medium of claim **9**, wherein the second channel is not an Internet Protocol (IP) channel.

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